Amendments to the Claims:

1. (currently amended): An integrated optical chip device for molecular diagnostics, comprising:

(a) a pair of lasers comprising a reference laser and a sensor laser, each comprising a waveguide having a gain section, opposing mirrors, including a partially transmissive mirror and a coherent light beam output section, at least one of the waveguides having a phase control section, the coherent light beam output sections being joined to enable coherent light outputs of the reference and sensor lasers to interfere;

(b) a sample chamber separate <u>and physically spaced</u> from said phase control section, at least partly formed through and exposing evanescent field material of the sensor laser, having an inlet for receiving a fluid and an outlet for discharging effluent; and

(c) a heterodyne detector at the juncture of the reference and sensor coherent light output sections, for detecting a change in the frequency of the coherent light output from the sensor laser resulting from a change in the index of refraction of fluid in the sample chamber.

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2. (previously presented): The chip device of claim 1 in which an adsorbent for molecules to be diagnosed is provided on the exposed evanescent field material of the sensor laser.

3. (original): The chip device of claim 2 in which the sample chamber comprises at least one dielectrophoretic electrode to increase the concentration of molecules to be diagnosed adjacent said adsorbent.

4. (original): The chip device of claim 1 in which said inlet and outlet are formed by microchannels through the body of said chip.

5. (previously presented): The chip device of claim 1 in which said sample chamber is between the phase control section and sampled grating mirror section of the sensor laser.

6. (original): The chip device of claim 1 in which the sensor laser includes said phase control section.

7. (original): The chip device of claim 1 wherein the mirror on each laser opposing the partially transmissive mirror is a facet mirror.

8. (original): The chip device of claim 1 wherein the partially transmissive mirror and the opposing mirror are both sampled-grating mirrors having different sampling periods.

9. (original): The chip device of claim 1 in which said exposed evanescent field region is between the gain section and one of the mirrors of the sensor laser.

10. (currently amended): An integrated optical chip device for molecular diagnostics, comprising:

(a) a tunable laser cavity sensor chip having:

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(i) a reference laser and a sensor laser, each comprising a waveguide having a gain section, opposing mirrors, including a partially transmissive mirror, and a coherent light beam output section, at least one of the waveguides having a phase control section, the coherent light beam output sections being joined to enable coherent light outputs of the reference and sensor lasers to interfere;

(ii) a sensor cavity separate <u>and physically spaced</u> from said phase control section, formed through and exposing evanescent field material of the sensor laser for receiving a fluid to be diagnosed; and

(iii) a heterodyne detector at the juncture of the reference and sensor coherent light output sections for detecting a change in the frequency of the

coherent light output from the sensor laser resulting from a change in the index of refraction of fluid in the sensor cavity; and

(b) a microfluidic chip formed with a sample cavity having an inlet for receiving fluid and an outlet for discharging effluent;

said tunable laser cavity sensor chip being connected to said mircrofluidic chip whereby the sensor and sample cavities define a sample chamber.

11. (original): The chip device of claim 10 in which the tunable laser cavity sensor chip and the microfluidic chip are connected by flip-chip bonding.

12. (original): The chip device of claim 10 in which adsorbent material for molecules to be diagnosed is provided on the exposed material of the sensor laser.

13. (previously presented): The chip device of claim 12 in which the sample cavity comprises at least one dielectrophoretic electrode to increase the concentration of molecules to be diagnosed adjacent said adsorbent.

14. (previously presented): The chip device of claim 10 in which said sensor cavity is between the phase control section and sampled grating mirror section of the sensor laser.

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15. (original): The chip device of claim 10 in which the sensor laser includes said phase control section.

16. (original): A system for the identification of a molecular species in a fluid comprising a plurality of pairs of reference and sensor lasers of claim 2 having a common source of fluid to be diagnosed.

17. (original): The system of claim 16 in which the outlet of one pair of reference and sensor lasers is connected in series to the outlet of another pair of reference and sensor lasers.

18. (original): A system for the identification of a molecular species in a fluid comprising a plurality of integrated optical chip devices of claim 12 having a common source of fluid to be diagnosed.

19. (original): The system of claim 18 in which the outlet of one integrated optical chip device is connected in series to the inlet of another integrated optical chip device.

20. (original): A method for detecting a molecular species in a fluid, comprising:

directing fluid to be tested for said molecular species to the inlet of a sample chamber of an integrated optical chip device of claim 1; and

detecting a shift in frequency of the heterodyned coherent light outputs of the reference and sensor lasers thereof.

21. (original): A method for detecting a molecular species in a fluid, comprising:

directing fluid to be tested for said molecular species to the inlet of a sample chamber of an integrated optical chip device of claim 10; and

detecting a shift in frequency of the heterodyned coherent light outputs of the reference and sensor lasers thereof.

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22. (currently amended): A method for detecting a plurality of molecular species in a fluid, comprising:

using phase control means to establish a heterodyned frequency of a reference laser and a sensor laser carried by a chip, the sensor laser having exposed evanescent field material~~,~~ carrying a first adsorbent thereon, separate and physically spaced from said phase control means, for a first molecular species exposed to said fluid;

directing fluid to be diagnosed from a source thereof to said first adsorbent;

detecting a shift in the heterodyned frequency as an indicator of the presence of said first molecular species in said fluid; and

repeating the foregoing steps with a second pair of lasers carried by said chip having a second adsorbent carried by evanescent field material, whereby to detect a shift in the heterodyned frequency thereof as an indicator of the presence of said second molecular species in said fluid.

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23. (previously presented): The method of claim 22, in which said fluid to be diagnosed is directed from said first adsorbent to said second adsorbent.

24. (original): The method of claim 22, in which the frequency or wavelength of the reference and sensor lasers are shifted to determine the properties of detected species as a function of wavelength.